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EDITORIAL

It is a common-place axiom that the most widely held assumptions are false. For instance, nearly all medical students hold that their subject is much more complicated and difficult than it used to be. Textbooks grow larger almost as fast as they rise in price, new drugs, procedures and even diseases are introduced every year. Medical knowledge seems to increase in a geometrical progression. This may be a depressing thought to the medical student about to enter the examination hall, but such thoughts should be banished, for, in spite of temporary setbacks, such as the discovery of electrolytes, the study and practice of medicine is far easier than it used to be.

To illustrate this, imagine the student witch-doctor taking his finals. What a plight ! He enters the mud-hut for his "long case" armed only with an ornate mask to hide his terrified face. He sees that the patient is ill, but like the doctor in this country a hundred or two hundred years ago, he has no method of examining him, no instruments to help, and no real treatment to offer him. Like the doctors of long ago were, the young witch-doctor will have been instructed for several years and will have had to study the art of medicine assidiously, but nearly everything he has had to learn will be nonsense. Compare his situation with that of his fortunate modern successor, who has been taught how to elicit a history and conduct a physical examination along logical lines, and who has a large and varied armamentarium of instruments to assist him, tape measures, specula, spatulae, proctoscopes, patella hammers, to mention only a few aids to examination unknown in less civilised days.

The qualified doctor is in an even more fortunate position. He can suggest numberless pathological tests, X-ray, encephalographic and many other investigations. If even this scientific onslaught fails to establish the diagnosis, the patient can be referred to the special departments. The nature of the patient's illness at last discovered, treatment can begin, and it is an extraordinary fact that there is hardly a disease which is treated in the same way as it was treated years ago, and in many cases extraordinary that such treatments should have been advocated.

We are, in fact, very lucky to have our jobs made so easy by the remarkable advances in thinking and knowledge in the last hundred years. Let us not be too complacent, however, for doubtless in fifty years time our own age will appear as one of relative ignorance and darkness.

CALENDAR

MAY

Sat. 2—Dr. E. R. Cullinan on duty.
Mr. J. P. Hosford on duty.
Mr. C. Langton Hewer on duty.

Tues. 5—Abernethian Society. Sir Vivian Fuchs.

Sat. 9—Medical and Surgical Units on duty.
Mr. G. H. Ellis on duty.

Thur. 4—Abernethian Society. Dr. E. B. Strauss, "The Anatomy of Treachery."

Sat. 16—Dr. R. Bodley Scott on duty.
Mr. A. H. Hunt on duty.
Mr. F. T. Evans on duty.

Sat. 23—Dr. A. W. Spence on duty.
Mr. C. Naunton Morgan on duty.
Mr. R. A. Bowen on duty.

Sat. 30—Dr. G. Hayward on duty.
Mr. A. W. Badenoch on duty.
Mr. R. W. Ballantine on duty.
Sports Day.

Abernethian Society

On Tuesday, March 10th, Professor P. C. Thonemann honoured us by addressing the Abernethian Society. This very distinguished Australian, who directs research on the "Zeta" project at Harwell, spoke in a manner clear to the uninitiated, but still informative to those who have a basic grasp of nuclear physics. One was struck by his modesty and the pains he took to describe the progress in similar projects elsewhere. Of great interest were the techniques used in the measurement of high temperatures, and much of interest on this topic was brought out at question time. It was a most enlightening evening, and well deserved the very large audience which appeared.

Transatlantic Visitors

On April 15th, four American and one Canadian Orthopaedic Surgeons visited the Hospital and Medical College. The day was spent in a series of informal clinical demonstrations. During the lunch interval they saw an exhibition of Historical and Pathological Specimens from the Museum, illustrating the contribution to orthopaedic surgery made by past Bart's men, including Percivall Pott, Abernethy and Paget.

This exhibition remained open for the remainder of the day and throughout the next, during which time it entertained an enlightened a considerable number of students.

Hospitals Symphony Orchestra

The orchestra performed on St. Patrick's day in the Duke's Hall at the Royal Academy. The active interest displayed by the medical profession in music is rather greater than is generally believed : the orchestra is of a considerable size (supported by no small Barts. contingent) and includes a wide range of talent (both medically and musically). The body of sound which results is full and abounding with an enthusiasm which tends to suppress some of the finer and more delicate turns of phrase. However, for this evening the orchestra was considerably augmented by professional musicians and while this may be considered an advisable precaution to be taken before an amateur orchestra undertakes to perform in public, it was justifiably resented by those medics asked to retire at the penultimate rehearsal.

Two major works were performed. In the first half, Mozart's Sinfonia Concertante (in E Flat, K 364) for violin and viola (Stephen Staryck and John Underwood) was played with an admirable lightness and accuracy by a rather reduced orchestra, and although the commencement of the last movement was perhaps lacking in the liveliness it demands, the work was an outstanding success.

During the second half of the concert, Symphony No. 5½ by the American, Don Gillis (written in 1947), brought cheers from the audience. The titles of some of the movements (Spiritual?, Scherzophrenia, Frolicsome Finale) are suggestive of the nature of this "jazz symphony" whose

atmosphere was well displayed by some excellent work by the clarinets. It is a difficult work to play, and there was considerable fumbling, but its character was not missed, and certainly enjoyed by orchestra and audience alike.

Part of Walton's arrangement of Bach's music for the ballet " The Wise Virgins " — perhaps not so well known, but nevertheless deeply satisfying — formed the introduction to the concert. Rossini's overture to "The Barber of Seville ", and Johann Strauss's very popular " Radetzky March" completed the programme. David Bateman conducted elegantly but perhaps not firmly enough, but during the preceding weeks he shaped the orchestra into its present fine fettle. The popularity and success of the occasion may be judged by the very considerable size of the audience.

P. J. W.

ANNOUNCEMENTS

Engagements

BENCH—WILLSON.—The engagement is announced between Dr. John T. Bench and Jacqueline Willson.

DURRANT—TUFFT.—The engagement is announced between Keith Durrant and Jill Tufft.

MULCAHY—WILLIAMSON.—The engagement is announced between Dr. Desmond Mulcahy and Jill Margaret Williamson.

Marriages

GOODWIN—BRUCE.—On March 14th, Dr. Charles Stewart Goodwin to Jean Elizabeth Bruce.

ROLES—DONALDSON.—On March 7th, at St. Bartholomew-the-Great, Nicholas Crosbie Roles to Wendy Donaldson.

Births

GLENISTER.—On March 4th, to Monique, wife of Dr. T. W. A. Glenister, a fourth son (Ian Simon).

LIPMAN COHEN.—On March 13th, to Joyce Hilary, wife of Dr. Eric Lipman Cohen, a daughter (Deborah Lucy).

MCKINNA.—On March 16th, to Marilyn and Alan McKinna, a son (Charles Andrew).

STEEL.—On March 12th, to Rosamond, wife of Dr. Peter Steel, a daughter, sister for John and Sarah.

WADDY.—On March 5th, to Mary, wife of Dr. G. W. Waddy, a son (Simon Granville).

Deaths

BULL.—On March 2nd, Dr. George Vernon Bull, aged 86. Qualified 1899.

CLINDENING.—On March 23rd, Dr. Frederick Talbot Driffield Clindening, in his 100th year. Qualified 1894.

COOK.—On February 8th, Dr. Joseph Basil Cook, aged 81. Qualified 1902.

GIBSON.—On March 6th, William Robert Gibson. F.R.C.S., D.P.H., aged 87. Qualified 1896.

HAMILL.—On March 4th, Dr. Philip Hamill, aged 75. Qualified 1910

MOREL.—On March 25th, Mervyn Philip Morel, F.R.C.S., aged 51. Qualified 1933.

NOTICES

Changes of Address

Dr. W. Norman Taylor,
c/o White Row,
Beckington, Bath.
Formerly of World Health Organisation, Nigeria.

Mr. J. E. R. McDonagh,
Park Gate,
Onehouse,
Nr. Stowmarket, Suffolk.
Late of 42 Wimpole Street, W.1.

Forthcoming Lecture

The next lecture on General Practice will be given by Dr. T. O. McKane, at 12 noon on Friday, June 5th.

A CASE OF BILATERAL ACOUSTIC NERVE TUMOURS

by J. A. McKinna

The Acoustic Nerve tumour is one of the more common space occupying lesions which may occur in the posterior cranial fossa. It is a benign lesion which has presented a challenge to neurosurgeons for the past sixty years. Because of its situation on the course of the eighth cranial nerve between the brain-stem and the internal auditory meatus, this tumour presents a logical diagnostic and surgical problem. In addition to reporting this case of a girl from whom bilateral acoustic nerve tumours have been removed (an almost unique occurrence) it seems worthwhile also to describe the tumour itself.

Case Report

In April 1954, Miss A. H. was referred to Mr. J. E. A. O'Connell. She was 16 years old and she complained of deafness and tinnitus in both ears. This had started eighteen months previously in the left ear and been noticed in the right six months later. P.H. She was born with a squint in the left eye, for which she had two unsuccessful operations at the age of 14 years. When she was 7 she had a left otitis media with perforation of the drum. F.H. : She was the eldest child of four, her parents were healthy and there was no family history of ear disease or neurofibromatosis.

Examination at that time revealed a quiet, deaf girl who lip-read well. She was of slight build and heart, lungs and abdomen were normal. Apart from several small pigmented spots on her body, she had three neurofibromata — flat, tender pigmented nodules about 1 cm. in diameter — two on the chest and one on the right loin.

Neurological examination : there was 0.5 cm. proptosis of the left eye (non-pulsatile). The visual acuity was normal on the right but reduced on the left (6/18 and J6). Fields were full and there was no papilloedema. The left external rectus was completely paralysed (this was the congenital squint with an associated amblyopia). The left pupil reacted sluggishly and there was a diminution of upward gaze on that side, i.e. slight impairment of third nerve function. There was reduced sensibility on the left side of the face supplied by the first division of the fifth nerve and impaired left corneal sensation. There was a slight peripheral left facial weakness. The left ear was totally deaf and there was a small, old clean perforation of the left drum. With the right ear she could just hear a conversational voice at a distance of two feet. Caloric responses were absent on the left and very poor on the right. The IXth to XIIth cranial nerves were normal as was examination of spinal motor, sensory and reflex function. Nystagmus was present, being horizontal in both directions with the coarser phase apparent on looking to the right. There was ataxia of the left arm, her gait was ataxic with veering to the left. Romberg's test was positive — to the left. *Skull X-ray* showed enlargement of the left internal auditory meatus and erosion of the petrous pyramid. Figure 1.

Fig. 1

X-ray (1954) *showing the erosion of the petrous bones pre-operatively, especially on the left* (*Towne's view*).

A probable diagnosis of bilateral acoustic nerve tumours was made, the one on the left side causing most of the signs. On 17th May, 1954 a unilateral left sub-occipital craniectomy was performed. Two meningiomas were found in relation to the lateral sinus and excised (one with considerable difficulty because of its intimate connections with the vessel well). Cerebellar uncapping revealed a tumour in the left cerebello-pontine angle. During its removal it was

noticed to be partly cystic. Towards the end of the dissection the VIIth and VIIIth cranial nerves were seen and sacrificed. The eroded internal meatus was cauterised to rid it of all tumour. After closure of the dura and the myo-plastic flap, tarsorraphy was carried out. Histologically the tumour was a typical acoustic neurinoma.

Apart from a complete left facial palsy her post-operative recovery was good. Her ataxia soon improved and a month later she had a second operation : a left facio-hypoglossal anastomosis in the neck. When discharged five weeks later the wounds had healed well and the decompression was flat. The left third signs had disappeared but sensation in all three divisions of the left trigeminal nerve was impaired. Ataxia was less but there was still some dysmetria of the left arm. She remained well with little change in the signs. The facio-hypoglossal anastomosis showed good result after eighteen months and the eye-lids were divided. Figure 2.

Fig 2

1955 *photo of patient showing her teeth and demonstrating the left facial palsy.*

However, the deafness of her right ear slowly worsened and by February 1958, this deterioration had been noticeable to her for about six months. For four to five months she had frontal headaches night and morning for two months these had been bilateral. She had no visual disturbances or vomiting, only she did complain of anorexia and weight loss. She had tinnitus still — " like an air-raid siren " — and since the last operation, she had a poor sense of taste on the left side of her tongue. *Examination* revealed that she had lost weight. In the right sub-occipital skin there was a small tender neurofibroma.

Neurological examination : There was bilateral low-grade papilloedema with no change in the visual acuity or the full fields. The proptosis and external rectus palsy of the left eye were the same and again there were signs of left third nerve paresis similar to the pre-operative state in 1954. There was impairment of sensibility in all divisions of the left fifth nerve and in the lower two divisions on the right. Corneal sensation was present but neither reflex was brisk. There was no right facial weakness and the left side of the face had some tone and movement as a result of the facial nerve anastomosis (with atrophy of the left side of the tongue). There was complete bilateral deafness. Horizontal nystagmus was present. Finger-nose testing was slow but accurate, but there was bilateral dysdiadochokinesis, more of the left hand than the right. She walked on a broad base deviating to the right and Romberg's test was strongly positive. Caloric tests were not done. Spinal motor, sensory and reflex examination were normal.

Skull X-rays showed osteoporosis of the dorsum sellae—evidence of raised intra-cranial pressure—and there was increased erosion of the right internal acoustic meatus since 1954 but, some re-ossification on the left side. Prior to a further operation, the presence of any intra-cranial tumour, other than a right cerebello-pontine angle one, was excluded by air ventriculography. This also demonstrated an internal hydrocephalus.

Operation : On March 7th, 1958, a right sub-occipital craniectomy was performed. Uncapping the cerebellum revealed a large tumour. Its anterior pole penetrated the tentorial foramen and the main body of the tumour deeply excavated the pons, medulla and cerebellum. As on the left the facial nerve had to be sacrificed during removal of the tumour. A right-sided tarsorraphy had been done prior to the operation.

Within eighteen hours of operation her respirations became embarrassed and stridulous. This preceded a collapse of the lower lobe of the left lung, and thirty hours after operation a tracheostomy was carried out.

Immediately her airway improved, and management of the tracheo-bronchial secretions, which she had been unable to cough up, became possible. She had a patchy pnuemonia of the left lung for some time. However, she started getting up in nine days and, after three and a half weeks, the tracheostomy tube was removed. Her convalescence was prolonged and difficult—the main problems being the ingestion of food and fluids. For the first two weeks after operation she was fed only by nasal stomach tube. Because of the facial palsies and the impairment of IXth and Xth nerve function (due to post-operative oedema) she had considerable difficulty in coughing and swallowing. Later when she became able to take semi-solids fairly easily she complained that her sense of taste was poor. Three months elapsed before she was eating and drinking adequately—a time which was full of considerable nursing persuasion and encouragement from the physiotherapists and the speech therapists. Her gait became steadier and the left-handed dysmetria receded. In the four months following her discharge from Hill End in June she had put on 1½ stone in weight. She still had some dysphagia but her speech, gait and co-ordination were progressing and are still doing so. Mr. O'Connell is considering the possibility of facio-accessory anastomosis on the right side to provide some tone to the right side of her face.

Fig. 3

X-ray (1958) *showing improvement on the left and deterioration on the right petrous bone, and showing the left sub-occipital craniectomy.*

Historical

The two earliest descriptions of Acoustic Tumours are usually ascribed to Sandifort in 1711 (Leyden) and to Charles Bell in 1830. Bell's clinical description was accompanied by post-mortem findings correlating the signs with the pathology. In 1917 Harvey Cushing published his classical monograph on the subject based on his own personal experience of thirty verified cases, and a similar number of supposed, but unverified, ones. He described the slowly growing tumour progressively producing certain symptoms and signs. These seemed to appear in such a consistent chronological order that he put it forward as being one of the cardinal diagnostic features of the tumour. Briefly these are :—

1. Auditory and vestibular disturbances.
2. Occipito-frontal head pains, with sub-occipital discomfort and tenderness.
3. Cerebellar disturbances.
4. Involvement of the adjacent cranial nerves.
5. Raised intra-cranial pressure and papilloedema.
6. Dysarthria, dysphagia and, eventually, cerebellar and respiratory crises.

Although certain workers agree with Cushing about this order (incidentally, on which did not hold entirely true in all his own cases), more recent work suggests that as a chronological order, it is not as important as Cushing suggests. This is based on analyses of nearly 150 cases of Walter Dandy's at Johns Hopkins Hospital (Revilla), and of a similar number in this country (Edwards and Paterson).

Sex Age and Side Incidence

From all the series reviewed slightly more females are involved, approximately in the ratio of 60% to 40%. There is little difference between the numbers occurring on each side. Both Cushing and Dandy have stressed that these tumours are rarely seen in the first two decades of life and that they occur most commonly between the ages of twenty-five and sixty. Some however do occur in the younger age groups (the youngest recorded

being a girl of 8½) and this is especially true of bilateral tumours or of those unilateral ones which are associated with multiple neuro-fibromatosis (von Recklinghausen's disease). Bilateral tumours are uncommon but two of Dandy's cases were sisters in a family in whom these tumours seemed to be inherited as a Mendelian dominant "characteristic". In five generations of this one family, 35 out of 217 members on the maternal side — with an equal sex incidence — died about five years after the onset of bilateral deafness. Fifteen of these also became blind but none had evidence of neurofibromatosis elsewhere.

Symptoms and Signs

In nearly all cases the first symptoms of the tumour are related to the eighth cranial nerve. By the time that a patient is seen, maybe from three to five years after the onset of the initial symptoms there is always a history of partial or complete deafness of one ear. Frequently it is associated with tinnitus : usually described as a whistling noise or like the sound of escaping steam.

Less commonly the patient complains of "giddiness" or "dizziness", most often related to sudden head movements and sometimes associated with nausea. "Giddiness" means a legion of different sensations to different people but it is worthwhile remembering Gowers' description of vertigo : ". . . any movement or sense of movement, either in the individual himself or in external objects, that involves a defect, real or seeming, in the equilibrium of the body." This early mild vertigo of the patient with an acoustic neurinoma is probably vestibular in origin, being a response of the imbalance between a normal vestibular nerve and the poorly functioning one on the side of the tumour. Later in the development of the tumour a more severe vertigo appears in combination with ataxia and is almost certainly due to pressure on the cerebellar peduncle.

In most cases first examination reveals some degree of deafness on one side and in half of them this is complete. However caloric tests reveal gross impairment or complete absence of vestibular function in about four-fifths of the cases.

The next most commonly affected structure is the trigeminal nerve. Half of all patients have sensory symptoms, usually of numbness and paraesthesiae on the side of the face (the same side as the tumour). Rarely (but not once in Cushing's first series) is there a complaint of paroxysmal trigeminal pain simulating "*tic doloureux*". Although examination of some patients reveals a weakness of the muscles of mastication, this fact has invariably escaped their notice. The most accurate sign of impairment of trigeminal sensory function is the corneal reflex. In 90% of cases the corneal sensation is reduced ipsilaterally ; in 50% it is completely absent. In a smaller proportion there is some loss of sensibility to pin-prick or to light touch on the face.

Headaches are most frequently frontal but they seem to be unrelated to the presence or absence of raised inta-cranial pressure. Less often these are sub-occipital or occipital and associated with tenderness at the back of the neck or behind the ear.

The first symptoms which relate to cerebellar dysfunction are of instability of gait but, if only one is concerned it is much more often the arm than the leg which is objectively ataxic. It seems that patients are more aware of clumsy ataxia of their legs than of any fine loss of control in the movements of their arms or hands. These symptoms and signs are mainly ipsilateral — though they may be contralateral or even bilateral ; these latter phenomena being caused by a shift of the mid-line in the posterior fossa. However the most common sign of cerebellar involvement — found in 90% of subjects — is nystagmus. In 50% this is horizontal only : characteristically this is a bilateral horizontal nystagmus with its slower coarser phase appearing towards the side of the tumour on looking to that side. The remainder have vertical or oscillatory nystagmus.

Between 20% to 30% of patients complain of diplopia. In the main this is due to an ipsilateral sixth nerve palsy ; this is often a false localising sign and may be related to a rise in intra-cranial pressure and an alteration of the normal anatomical relations at the tentorial foramen. As the rise in pressure continues there may be further oculomotor palsies and visual difficulties in company with the development of papilloedema. The consequent internal hydrocephalus may be associated with mental and personality changes.

However, before these effects take place the tumour exerts pressure on its nearest ranial nerve "neighbour". It may seem at paradox that trigeminal function is impaired before that of the facial nerve when one remembers the similarity and proximity of

course of the seventh and eighth cranial nerves. In spite of this symptoms are rare and are of loss of ability to taste rather than of facial weakness. About half of all cases show a peripheral weakness of the facial nerve which is rarely severe.

Involvement of the lower cranial nerves are uncommon until late in the development of the tumour. Dysphagia and dysarthria are rare symptoms but the signs of palatal or vocal cord pareses occur slightly more frequently. Pyramidal signs occur in only 10% to 20% of cases. This also seems unusual bearing in mind the proximity of all these structures. Later there are the final consequences of raised intra-cranial pressure (as already

Fig. 4

Post-operative Towne's view showing the bilateral sub-occipital craniectomy.

mentioned) which, in the untreated case, culminate in coma and death.

Special Investigations

Skull X-rays. Certain views are taken which may show enlargement of the internal auditory meatus and erosion of the petrous temporal bone. Absence of these findings does not indicate the absence of a tumour but, positive results may clinch the diagnosis in a difficult case. Long standing raised intra-cranial pressure may be evidenced by destruction of the dorsum sellae and the posterior clinoids. Contrast X-rays — air studies or arteriograms — are rarely necessary. Fig. 4.

Electro-encephalography is of doubtful use in the localisation of posterior fossa tumours. *Audiometry* will reveal quantitative details of the deafness and *Caloric tests* must be carried out to estimate the impairment of vestibular function (Care must be taken in examination of the external meatus and the ear drum to exclude obstruction or local pathology).

Lumbar puncture in these cases is associated with a considerable risk — a risk of " coning " either at the foramen magnum due to the size and presence of the tumour in the posterior fossa, or at the tentorial opening because of raised intra-cranial pressure. If lumbar puncture is performed the C.S.F. is clear and usually colourless. It is sometimes slightly xanthochromic when the protein content is very high ; this is always raised : commonly between 50 and 200 mgm. per 100 ml. and sometimes well above these levels. Normally there is no change in the cells or other constituents of the fluid.

Differential Diagnosis

Many other tumours occur in the posterior fossa, the common ones being meningiomas, gliomas and the secondary tumours from primary sites elsewhere in the body. The meningioma of the cerebello-pontine angle presents a similar picture but, it is one in which the hearing loss occurs later, adjacent cranial nerves are involved more frequently and more severly, the average age (45) is higher and X-ray changes are rare.

Cerebellar tumours give rise to the changes of raised intra-cranial pressure sooner and with less evidence of cranial nerve signs. Gliomas of the cerebellum and the pons tend to occur in younger age groups and the former have a rapid onset of symptoms. On the other hand brain-stem tumours show extensive cranial nerve involvement and long tract signs, which are often bilateral.

Bilateral acoustic tumours may be present but it must be remembered that bilateral cerebellar and trigeminal signs may be caused by a unilateral tumour alone or in association with other neurofibromata.

Chronic otitis media may lead either to a localised cystic arachnoiditis in the angle mimicking the tumour, or else to a posterior fossa abscess which will act as an acute space-occupying lesion. Auditory conditions which must be borne in mind are otosclerosis and Meniere's disease. The former is a condition, possibly hereditary, occurring in the years of 40 to 60. Examination reveals a (progressive) inner ear deafness which is associated with a minimum of vertigo and

none of the other features of the acoustic nerve tumour. Menieres disease is characterised by sudden bouts of vertigo, nausea and vomiting, and tinnitus — all accentuated by postural changes. Examination may reveal slight hearing loss but the vestibular responses are nearly always normal or even hyperactive.

Pathology

When the anatomy of the area is recalled, it will be understood that the tumour is situated on the postero-superior border of the petrous temporal bone, lying over the internal auditory meatus and between it and the pons and upper medulla. It is anterior to the cerebellar hemisphere and inferior to the tentorium. Over its surface run branches of the basilar artery and large veins which mainly run into the sigmoid sinus. The eighth cranial nerve may be seen entering the inner aspect of the tumour but its peripheral part is always masked by the presence of tumour in the internal meatus. The facial nerve is stretched across the anterior surface and the fifth nerve is also distorted by this part of the growth. Around its inferior pole the, ninth, tenth and eleventh nerves may be stretched to some extent. The cerebellum and the brain-stem are pushed to the other side of the posterior fossa. When the tumour is large the cerebellar tonsils are pushed down into the foramen magnum. The petrous bone, especially at the internal meatus, is often eroded by the tumour. Hydrocephalus and dilatation of the floor of the third ventricle causes the erosion of the dorsum sellae.

Macroscopically these are encapsulated tumours, usually round or oval but sometimes lobulated. Most vary from 1 to 5 cm. in diameter and the posterior aspect is often clothed by an arachnoid cyst. Parts are yellow, soft and buttery and others are of brown firm tissue. Some areas are cystic Histologically there are two characteristic types of cell : (*a*) dense masses of long bipolar cells with elongated nuclei — these making up the fibrous parts of the tumour and which are separated by (*b*) a loose-meshed reticulum of cells with rounded nuclei. The origins of the tumour are still not certain but it is thought that the elongated cells are derived from Schwann sheath cells whilst the reticular cells are of glial origin. The doubts about pathology and histogenesis have caused confusion of terminology. Neurinoma, neurofibroma and neuroma have all been used as well as the tumour of the cerebello-pontine angle. It is important to note that " neuroma " is an unsatisfactory term since it commonly denotes the scar developing at the cut end of a peripheral nerve.

Operation

This is the only treatment and prior to Cushing's heroic advances most results had been very depressing — in 1906, Sir Victor Horsley had spoken of his operative mortality of 60% — 70%. Cushing regarded total excision as an unlikely event but he developed the intra-capsular enucleation of the tumour via an adequate (bilateral) approach. In other words his operation was a decompressive manoeuvre : a general posterior fossa decompression by means of the sub-occipital craniectomy and a local tumour decompression by removal of its nucleus. That enucleation with the finger of the brain-spoon was a lethal procedure was well noted by Dandy who described the now classical, unilateral operation. This is through a vertical paramedian incision and a wide unilateral suboccipital craniectomy. Drainage of the lateral ventricle is carried out through a separate burr-hole and after reflection of the dura the lateral one-third of the cerebellar hemisphere is excised (" uncapping "). This allows exposure of the tumour with a minimum of traction on the cerebellar peduncle and much less post-operative cerebellar dysfunction. Electro-cautery and suction are used to enucleate the tumour and then the capsule is painstakingly dissected from the surrounding brain-stem, cranial nerves and from within the meatus. Aiming at complete cure, this procedure rarely allows preservation of the facial nerve. Tarsorraphy is a necessary accompaniment of the operation in view of the complete facial palsy and the absent or reduced corneal sensation.

In Dandy's own series the operative mortality figures dropped from 22% to 6.5% when he first used this new technique and eventually the overall mortality dropped to about 2.5%. Post-operative deaths commonly occur in the first 48 hours. There are four main causes :

(1) Direct trauma to the brain-stem.
(2) Interference with the brain-stem and cerebellar blood supply.
(3) Respiratory crises—aspiration pneumonia due to inefficient coughing and swallowing as a result of operative trauma to the lower cranial nerves ; or pulmonary embolism.

(4) Meningitis as a later complication (sometimes with a C.S.F. fistula)

Following successful post-operative convalescence the best means of overcoming the facial palsy is by facio-hypoglossal anastomosis in the neck, although some surgeons favour facio-accessory anastomosis. Dandy operated on six cases of bilateral nerve tumours — of these, there is evidence of only one having survived removal of both tumours. In another six cases mentioned by Pool, three have made good recoveries after total removal on one side and incomplete removal on the other.

Conclusion

The acoustic nerve tumour remains a lesion which presents diagnostic and therapeutic difficulties. The diagnosis is not easy in patients between the ages of 40 and 60. In these people, mild deafness with or without tinnitus, and occasional giddiness and headache are symptoms which are easily ascribed to the " processes of ageing " and to benign aural conditions (real or imaginary) by a busy practitioner. This, together with the insidious development of the clinical picture, produces some delay between onset and diagnosis and eventual treatment. By then raised intra-cranial pressure is a feature weighing considerably against operative success, apart from local factors in the posterior fossa. On examination the cardinal features are deafness associated with cerebellar dysfunction and trigeminal sensory loss. In other words, a triad of deafness, nystagmus and reduced (or absent) corneal reflex should at once suggest the presence of an acoustic nerve tumour. As an example is the case reported of a girl, now 21 years old, who has had bilateral tumours successfully removed in the past five years.

(My thanks are due to Mr. O'Connell for permission to report this case and for his help and encouragement throughout its preparation).

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Examination Successes

UNIVERSITY OF OXFORD
Second B.M. Examination. Hilary Term 1959

Forensic Medicine and Public Health
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PHYSIOLOGY BEFORE WILLIAM HARVEY

by John R. Brown and John L. Thornton

The term " physiology " has undergone many changes in inference, and originally implied an enquiry into nature. Later it came to include the normal structure and function of the human subject, but the functional aspect was very theoretical, and frequently the older usage persisted. For example, William Duncan's *Physiologica* of 1651 contains a section devoted to metals and precious stones. With the growth of experimental science the division between structure and function has widened, and in recent years " physiology " has become limited to knowledge gained by scientific means of the normal functioning of organisms, or their constituent parts.

The development of scientific method might be considered to be a product of Greek civilization, but there are records of more ancient civilizations that included an extensive knowledge of medicine. China, Babylonia, Assyria, and India, for example, were advanced in medical matters at very early dates, but we have little available evidence from which to glean facts. Egypt, however, has bequeathed to us several medical papyri, and we possess practical evidence of anatomical knowledge in ancient Egypt in the form of mummies. The Edwin Smith surgical papyrus was probably written in the sixteenth century B.C., and refers to the pulsation of vessels in various parts of the body. The Papyrus Ebers (1500 B.C.) describes the pulsation of the heart in the precordial areas, and introduces for the first time the concept that the heart is the most important organ in the body, the seat of the intelligence and of the emotions. So great was the importance placed on this organ that in ancient Egypt the bodies were always preserved with the heart in situ. This concept was maintained by Hippocrates, who considered that the heart, being a strong muscular organ, was immune to injury and disease. The left ventricle was the seat of intelligence and understanding. Aristotle regarded the heart as the seat of the soul, the seat of vitality, and the source of the blood.

About 530 B.C. Pythagoras settled in Croton, a Dorian colony in Sicily, and from his teachings arose the Sicillian school of medicine. He introduced a regular system of dietetics, and instructed his pupils in the theory of medicine. Pythagoras also studied arithmetic and its application to weights and measures. From this school came Alcmaeon (*c.* 500 B.C.), who constructed a positive basis for medical science founded upon animal experimentation. He discovered the optic nerves and the tube leading from the middle ear, later to be re-discovered by Eustachius. His theory of vision suggested that sight was the result of the lachrymal secretions, and that the eye contained fire, for a blow upon the eye causes flashes of light. Alcmaeon also considered that all the organs of sensation were somehow or other connected to the brain, in that when the brain is agitated paralysis of sensation results. Furthermore, that the brain was the governing faculty of the body.

Important for his influence on later physiological thought is Empedocles of Agrigentum, Sicily. He postulated that the heart is the seat of the innate heat of the body, and the centre of the blood vascular system through which the innate heat, or " essential factor of life", is distributed to the body. In ancient philosophy, life was considered to be derived from a special abstract quality, the Pneuma, of which Empedocles regarded the heart as the source. It is to him that we owe the origin of the doctrine of " the fours". He considered that throughout nature there were two dominant characteristics of Opposition and of Affinity. All matter consisted of four elements, Fire and Water, Earth and Air, and exhibited these two dominant characters. These were in opposition or alliance to one another; Water opposes Fire, but is allied to Earth. In addition to the four elements there were four Primary Qualities, Heat and Cold, Moisture and Dryness. At that time and for several centuries later medical philosophy was based upon the interaction of these elements and qualities, to which Hippocrates added the four

Humours. These ideas persisted into the Middle Ages, when they became the doctrine of the physical and physiological fours.

One of the last members of the Sicilian school, Diogenes of Apollonia, was greatly influenced by the pneumatic theory elaborated by Empedocles, and made extensive investigations into the blood vascular system. He described the vena cava with its main branches.

Until the advent of Hippocrates (*c.* 460-*c.* 370 B.C.) the pursuit of medical enquiry was largely philosophical, with very little experimentation. Hippocrates freed medicine from speculation, mysticism and superstition. The Hippocratic Method may be considered simply as follows: Observe the facts: Be sceptical of the marvellous: Hesitate to theorise beyond the facts, but be eager to generalise from actual experience. The Hippocratic method is amply demonstrated in his investigation of epilepsy, the "sacred disease". In his book, *On the nature of man*, Hippocrates states that the body is composed of four humours, Blood, Phlegm, Yellow Bile, and Black Bile. In health these are combined in the correct proportions, disease resulting from the preponderance of one of them. The humours are related to the four qualities and elements.

From about the fourth century B.C. Athens became the main centre of the medical sciences, and it was there that Aristotle, a pupil of Plato, founded the Peripatetic School of medicine. This was so called because Aristotle had a garden in Athens known as the Lyceum, and there he taught his pupils as he walked around. Plato taught that the heart was the organ which set the blood in motion, and he was the first man to name the great vessel of the body as the Aorta. But it is with Aristotle that we are concerned as the great codifier of ancient science, on whom all subsequent biological development, including that of modern times, is based. He laid the basis of organic evolution in his teaching concerning the "Scala natura". Aristotle developed coherent theories of generation and heredity, and contributed greatly to comparative anatomy. Although he was an excellent naturalist, he did not have the same affinity for physiology. He made no proper distinction between arteries and veins, and failed to connect the organs of sense with the brain, a structure which played only a minor role in Aristotelian physiology. He considered that the brain acted as the cooling system of the heart by the secretion of Phlegm.

Concerning generation. The material substance of the developing embryo is contributed by the female, but is passive. The male, by giving the principle of life, the soul or "Phyche", contributes the essential generative agency. Since the soul is of itself not material, it is therefore theoretically unnecessary for anything material to pass from the male to the female. The essential contribution of the male is not matter, but form and principle. Two thousand years later, Harvey in his *De generatione*, 1651, shared the same view. Modern studies in fact show that under certain circumstances parthenogenesis can take place.

On the circulation. To Aristotle it was manifest that warmth is inherent to life, and that when warmth departs, life does likewise. He reasoned that in some way or other life is dependent on the food we eat and the air we breath, and he set himself the task of blending these principles into a rational system of physiology, one compatible with the vascular system as he knew it. The heart covered by the pericardium consisted of three chambers, the right and the left ventricles and the left auricle. Up to the time of Harvey it was convenient to consider the heart functionally as the right and left ventricles, with the auricles as convenient antechambers. Aristotle considered the right auricle as the meeting place of the great vessels, the superior and inferior venae cavae. Upon intestinal absorption, food becomes "Plasma", which is carried via the veins to the right side of the heart, and via the arteries to the left side. Under the heating influence of the heart the plasma becomes blood. The heat induces expansion of the blood, lifting up the walls of the ventricles and giving rise to pulsation. Simultaneously it causes expansion of the lung, and as a result air from the lung passes down the pulmonary vessels to cool the heart, following which the lungs and thorax collapse coincident with systole. The blood, endowed with the heat from the heart, is then distributed throughout the body. His description of the action of the heart is as that of a bellows, not of a pump.

The writings of Aristotle indicate that his observations were generally accurate, and one wonders why he did not notice the discrepancy between the pulse and the res-

piration rates. Had he done so his theory on the action of the heart would have been untenable. Aristotle had no conception of the circulation other than as a system of irrigation. He did, however, realise that there are two types of blood, that on the right side of the heart being more abundant and less pure than the blood on the left side.

On the death of Alexander the Great the chief centre of medical learning moved to Alexandria, where it prospered under the Ptolemies. It was there that anatomy and physiology became recognised disciplines under Herophilus of Chalcedon and Erasistratus of Chios respectively. The writings of these authors have been lost, and it is fortunate that something of what they achieved has been recorded in the works of Galen.

Herophilus on the Nervous System. Contrary to Aristotle, Herophilus placed the brain above the heart in importance; he distinguished between the cerebrum and the cerebellum, and commented on the cavities of the brain. He considered that locomotion was under the voluntary control of the nervous system, and appreciated the presence of a " nervous pathway " by which sensation reached the brain. Herophilus was thus one of the first to distinguish between sensory and motor nerves, later elaborated by Galen. Herophilus taught that the lung has a natural tendency to dilate and contract, and that its function is to receive fresh air from outside, to distribute it throughout the body, then to withdraw and finally expel it. He called the pulmonary artery the " arterial vein," a term that was to persist until the time of Harvey.

On the Circulation. Herophilus distinguished between arteries and veins, and held that the arteries contained blood, the pulse being involuntary since it arose from the contraction and dilatation of the arteries, as the result of impulses from the heart, which alone possessed the necessary motive power. He determined the pulse rate by the use of the water-clock (*clepsydra*), and distinguished between several pulse characteristics, e.g. the crawling " formicating " pulse, and the capering pulse. In his treatise on the pulse, Herophilus described four principal characteristics; size, frequency, strength and rhythm.

Often called the " Father of Physiology", Erasistratus was a contemporary of Herophilus at Alexandria. He was essentially a rationalist, and professed himself free of all mysticism. He had an objection to all hidden causes save on " Physics", which to him was " Nature". Erasistratus could not dismiss entirely the creative force, but attempted to reduce its activities to their simple terms. To his contemporaries he was a reactionary. For example, they considered that digestion was a process akin to cooking, the chief or only agent being the innate heat of the body. Erasistratus rejected this theory, preferring a mechanical process, the food being ground by the muscular action of the stomach, aided by the " pneuma " which entered the stomach via the arteries, and not along with the food itself. A similar controversy took place among physiologists in the seventeenth and eighteenth centuries. When digestion was complete chylos passed from the stomach and intestines to the liver, where it was transformed into blood.

The Physiological System of Erasistratus. The physiology of Erasistratus was based upon the observation that every tissue and organ of the body contained a threefold system of arteries, veins and nerves, which were considered to be hollow. The whole was built upon the existence of " Pneuma". In opposition to the teaching of Aristotle, he considered that there was no " innate breath " in the body, and that the pneuma was derived from outside the body. Pneuma was necessary to life, and must be of a certain density otherwise suffocation would result. Erasistratus remarks that the inhalation of the vapour produced by pouring water on charcoal causes suffocation. Blood was formed in the liver from " chylos", a product of digestion, the biliary contents being separated and passed into the bile duct. The blood reached the right ventricle via the vena cava. The pneuma, on reaching the left ventricle via the pulmonary vein and the left auricle, was changed into a special kind of pneuma, " Vital Spirit ", which was sent to various parts of the body by arteries. Erasistratus considered the heart as a pump. In diastole, pneuma was drawn into the left ventricle and blood into the right ventricle, and expelled during systole. The heart actively dilated and contracted by its own innate force, the arteries being passively dilated by the stream of vital spirit being forced into them. The vital spirit which reached the brain was transformed into the ventricles into the " Animal

Spirit", which then passed down the hollow nerves, causing expansion of the muscles, which resulted in muscular contraction and sensation. Erasistratus described how the semilunar valves acted, and the fact that the function of the bicuspid valve was to prevent the vital spirit leaving the heart save via the aorta, in the same way in which the tricuspid valve prevented the regurgitation of blood.

Every tissue was considered to be made up of a network of arteries, veins and nerves carrying blood for nourishment, and two types of pneuma necessary for sensation and movement. These structures divided and subdivided until their size was beyond the limits of vision. The final orifices of the arteries and veins Erasistratus regarded as synanastomoses, and he considered that under abnormal circumstances

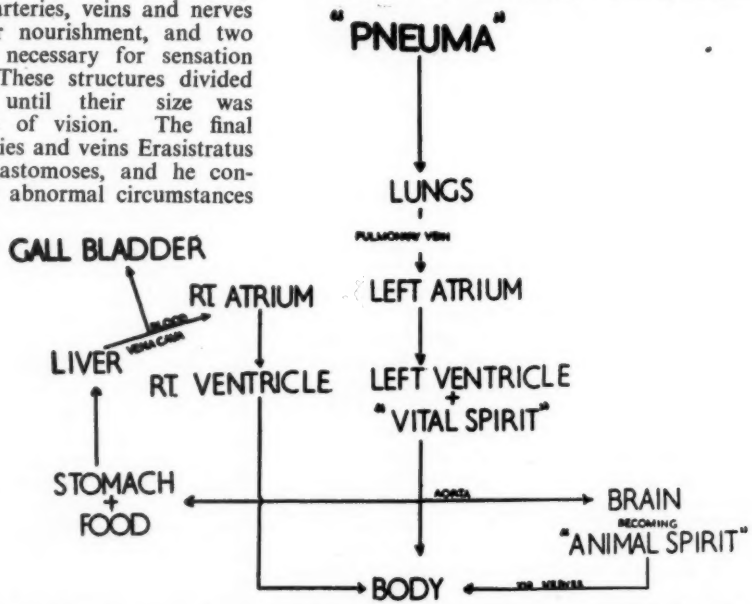

Fig. 1. *The Physiological System of Erasistratus.*

there was a communication between them through which blood might pass. He knew that blood came from a cut artery, which fact contradicts his assumption that the arteries are filled with the vital spirit. However, he explained the presence of blood as the immediate passage of blood across the synanastomosis when the artery is opened. It may be said that Erasistratus came near to the discovery of the circulation of the blood, but it should be appreciated that he considered that there was no connection in the heart between the arteries and veins. Since both "vital spirit" and blood were used up in the body there appeared to be no need for a circulation. (Fig. 1).

Of the many ancient schools of medicine perhaps, with the Hippocratic school, we owe most to the Eclectic School, which denoted philosophers who selected from various systems such opinions and principles as they judged to be sound and rational. In other words, an "eclectic" is one who, recognising an element of truth in all systems, collects a newer and fuller one out of the whole. Such was Claudius Galen born at Pergamon in 130 A.D. At this period there was a great interest in anatomy and dissection, not with the view of advancing scientific knowledge, but to provide recreation and amusement for the patrician classes. There were many medical texts available, but most were spurious. The rulers of those days were ardent collectors, and as a result of the demand many forgeries were passed off as genuine. In this way many of the Hippocratic texts were mutilated. Galen made critical surveys of the writings available at his time, and it is indeed due to him that we have any knowledge of the work of many of the previous writers.

At the time of Galen's pupillage it was considered that the left side of the heart and the arteries contained blood (a specialised form of air); the blood vessels (true to Hippocratic doctrine) arose in the head; the voice was said to be produced by the heart; the function of the kidney as a secreting organ was not known; and the knowledge of the function of the lungs was

where Erasistratus had left it nearly three hundred years before. At the age of eighteen Galen commenced the study of medicine under Satyrus, a keen anatomist at Pergamon. Then Galen journeyed some fifty miles south to Smyrna to study under Pleops, who taught him the basis of experimental medicine, encouraging him to write his first treatise on "The muscles of the thorax and the lung." Galen left Smyrna for Corinth, and later went to Alexandria where the library from his home town was then housed. He returned to Pergamon in 157 A.D. and was appointed to the School of Gladiators. Moving to Rome in 162 A.D., he lectured in a public theatre, and performed experiments on animals before large audiences. Galen was an experimenter, and did not believe that which he could not see or feel. Although he used the texts of his predecessors he did not quote that which he had not verified.

On the Circulation. Chyle derived from the products of digestion in the intestine is conveyed via the portal system to the liver. Here it is endowed with the vital spirit to become blood. In this Galen's ideas are the same as those of Erasistratus, and he considered that on reaching the vena cava the blood divides into two streams, upwards and downwards. The upper stream again divides into two flowing to the head and to the right ventricle. That entering the right ventricle receives the benefit of the innate heat of the heart, some purification is effected and "sooty fumes or excreta" pass via the pulmonary artery to the lungs, and are voided in expiration. This blood also provides for the nutrition of the lungs themselves. A small portion of the blood in the right ventricle passes through pores in the interventricular septum to the left ventricle, where it mixes with air drawn in from the lungs via the pulmonary vein during diastole. There, under the influence of the innate heat of the heart it becomes transformed into "vital spirit". The thermal equilibrium of the heart is maintained by the cooling inflow of air from the lungs. That portion of the blood reaching the brain is transformed into "animal spirit", which is carried away from the brain by means of the hollow nerves. The animal spirit subserves sensation and motion.

Galen was convinced of the terminal anastomoses and is said to have demonstrated their presence by draining away all the blood from a single artery. He indicated the presence of pulmonary anastomoses in that he thought that the small amount of blood brought to the lungs via the pulmonary artery found its way directly into the pulmonary veins, and thence to the left ventricle. He proved experimentally that the arteries do not contain air (as believed by Aristotle), but blood. With regard to the circulation Galen thought that the blood just ebbed and flowed, undergoing a constant process of purification. He demonstrated that the heart continues to beat for a considerable period after the rest of the body is quiescent following a high section of the spinal cord, and from this observation he concluded that the heart has an intrinsic pulsatile force within its own structure. This anticipated the work of Arthur Keith and Martin Flack in 1907 on the sinu auricular node. As an example of Galen's experimental methods, he gives details of exposure of the heart leaving the parietal pleura intact so that respiration may be preserved.

On the Nervous System. Galen carried out extensive investigations on the structure and function of the spinal cord, some of his observations being as follows: Longitudinal section of the cord does not give rise to muscular paralysis; complete section of the cord causes muscular paralysis and complete loss of sensation from both sides of the body; hemisection of the cord causes paralysis on the side of the excision.

On Respiration. In all animals the diaphragm is used for respiration of small amplitude. When the need for deeper respiration arises, as in exertion or in fever, or when the heat of the surrounding environment is increased, the animal is compelled to use its intercostal muscles as well as the diaphragm. In his experiments on respiration Galen studied the action of the phrenic nerve, section of which he remarked "considerably diminished movement of the lower part of the thorax", at the same time remarking on the increased activity of the accessory muscles of the neck. He traced the origins of the phrenic nerve, and described the course of the recurrent laryngeal nerve, noting that section of this nerve produced loss of voice. Galen investigated the phenomena of pneumothorax, and in one experiment placed a bag over an excision in the chest wall, noting that air was forced into the bag on expiration and withdrawn on inspiration.

On Digestion. The stomach did not act mechanically as Erasistratus had suggested, but was quiescent during digestion, the pyloric sphincter being closed. On the termination of digestion the latter opens and the digested food passes on into the intestine.

On the Urinary System. Galen observed that the ureters are set obliquely into the bladder wall, such provision being made by nature so that it would be impossible for the urine to return to the kidneys, no matter how full the bladder might become. He worked out the nerve supply and vascular system of the bladder, describing its sphincter muscle. In his experiments on the formation of the urine he tightly bandaged the ureters, and noticed that no urine escaped into the bladder, but that the ureters above the bandages were swollen. Galen considered that the human body may be examined from two aspects, philosophical and descriptive. He considered that all structures in the body had been formed by the Creator for a known and intelligible purpose: " Nature makes nought in vain". Galen's doctrine made a particular appeal to the Christian point of view, which is probably why his writings have been preserved in larger quantities than have those of other pagan writers. So much influence did Galen have on medical thought, that although he contributed much to the knowledge of physiology, blind obedience to certain of his writings containing fundamental errors retarded the progress of medical science for many centuries. For example, his concept of the movement of the blood, which assumed communication across the interventricular septum, was regarded as accurate even after the time of Vesalius. As a further illustration of the supposed infallibility of Galen, John Geymer was in 1559 fined by the College of Physicians for openly doubting his teachings, and Geymer was not admitted to the College until he publicly recanted.

It is to be regretted that the seed sown by Galen should have remained infertile for such a lengthy period. The rise of Christianity with its insistance on spiritual matters did nothing to help medical science, and the practical spirit of the Roman Empire was not calculated to advance pure science. The downfall of the Empire, and the Barbarian invasions heralded the advance of the Dark Ages. During this period the Arabian school of medicine was founded at Baghdad under the Caliphate, and is particularly noteworthy for its number of translations into Arabic of the earlier classical writings. Of this period al-Qurashi and Avicenna are of special interest to physiologists.

Avicenna was born at Karmisan, near Bokhara in 980 A.D., and wrote his first book on medicine at the age of twenty-one. The most famous of his writings was called the *Canon of medicine*, which was for long regarded as an infallible oracle. Avicenna considered that the pulse arose from the motion imparted to the veins during respiration. In his commentary on Avicenna's *Canon* al-Qurashi denied the presence of the invisible pores in the interventricular septum, as suggested by Galen, and considered that the blood was refined in the right ventricle by the heat of the heart, thence rising up the pulmonary artery into the lungs. A small amount of this blood, the fraction that was most highly refined, penetrated the ramification of the pulmonary vein mixed with air to enter the left ventricle together with more air from the lungs, being transformed into the " Vital Spirit." Al-Qurashi's comments on the pulmonary circulation antedate those of Servetus by several centuries.

In the Dark Ages little was added to medical knowledge that had not been established in the previous centuries. However, it is of interest to make brief reference to the medical and physiological speculations of those times. In St. John's College, Oxford, exists an eleventh century manuscript by Bryteferd, Monk of Ramsey, in which he writes of the four seasons of the year, the four qualities, the four humours. This follows the teaching of the School of Salerno, the whole being built up into the concept of the Physiological and Physical Fours, e.g. Blood rules the right; Red bile the right, also the gall bladder; Black bile the left, including the spleen; Phlegm, part to the head and part to the urinary bladder; Blood escapes via the nose; Red bile via the ears; Black bile via the eyes; Phlegm via the mouth. There were four tissues: bones, nerves, vessels, and flesh; four natural processes: eating, drinking, generation, and sleeping; four parts of the body: head, chest, belly and bladder. Spring was the enemy of the head; summer the chest; autumn the belly; winter the bladder. There were many other concepts of a similar nature all derived by analogy.

Following the period of the Dark Ages came the Renaissance, the fostering of the

SUMERIAN-SEMETIC EGYPTIAN CHINESE HINDU

GREEK AND ROMAN

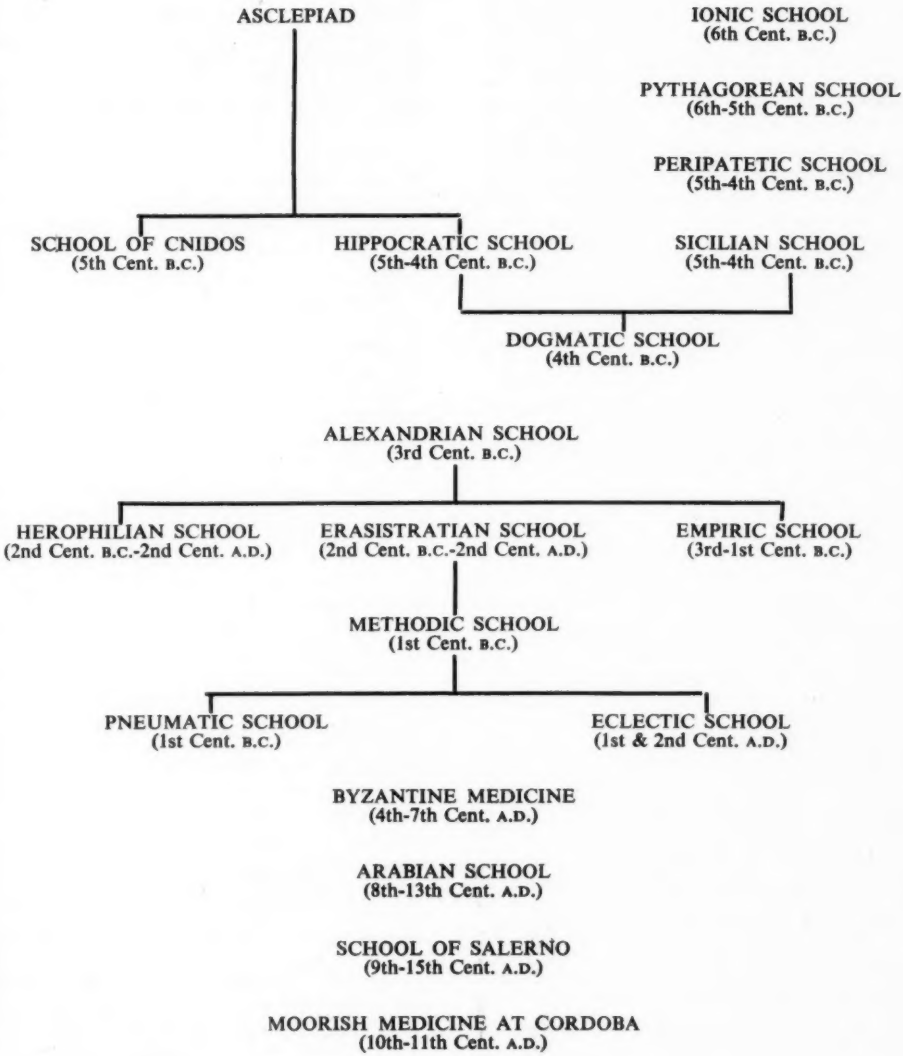

Fig. 2

Early Schools of Medicine.

humanities and the formation of the universities. It was the period of the revival of learning, the search for truth, and the escape from mysticism and superstition. To such a world came Leonardo da Vinci (1452-1519) who, in addition to many other scientific activities, made over one hundred dissections of the human body. He studied the heart, the eyes, and particularly contributed to our knowledge of myology and neurology. Galen had considered that the crystalline lens was the seat of vision, but Leonardo, realising that the lens gave an inverted image, suggested that the optic nerve was the visual receptor. He also studied the reaction of the pupil to light. While Leonardo's physiology was essentially that of the Galenic school, he carefully investigated the movement of the muscles, and made contributions to the anatomy and physiology of the nervous system. He gave considerable thought to the physiology of the foetus, and to the heart and vascular system. He recognised the heart as a muscular organ, and it has been suggested that he appreciated that the blood must circulate. Leonardo's anatomical drawings are superb, and reflect the profound thoughts of a brilliant anatomist and scientist.

The Renaissance gave rise to the scholar physicians, Linacre, Caius and Rabelais, and it is to such as these that we owe the debt of bridging the gap between the Middle Ages and the beginnings of modern scientific thought. William Gilbert (1544-1603) was President of the College of Physicians in the year his *De magnete* (1600) was published; this originated modern deductive methods. It has been suggested that Gilbert, by his example, helped to direct Harvey's thoughts to the investigation of problems by experiment and deduction. Sanctorius (1561-1636) inspired by Gallileo at Padua was the founder of the physiology of metabolism, and described a thermometer for taking the temperature of the human body. He invented a pulsometer, and conducted experiments on changes in the weight of the body under varying circumstances, proving loss of weight by insensible perspiration.

Robert Fludd (1574-1637), a mystic and a Rosicrucian, studied the pathology of the lung from an experimental point of view and is said to have been among the first to measure the temperature of the body with a "thermometer". Michael Servetus (1511-1553), scholar and physician, published in 1553 his *Christianissimi restitutio*, which contained certain "heretical" ideas, for the publication of which he was burned at the stake on October 27, 1553. This work is of interest to physiologists as he casually introduced among the theological discussions his account of the pulmonary circulation. Instead of accepting Galen's view that the main passage was through the interventricular septum, Servetus maintained that a more important communication existed in the lung between the primary artery and vein. The same fraction of blood which Galen considered to pass through the interventricular septum, Servetus maintained to filter through the new channel for the same Galenic purpose of coming into contact with the air, and thus originating the vital spirit.

Venesection had long been a popular method of medical treatment, and in the sixteenth and seventeenth centuries many studies were made on the functions of the veins. Amatus Lusitanus described the valves present in the azygos vein, and evidence indicates that his discovery antedated that of Giovanni Battista Canano of Ferrara (1515-1579). It was concerning the presence of these valves that Lusitanus came into serious conflict with Vesalius. Jacobus Sylvius (1478-1555) also described these valves. It may be stated that although many anatomists recognised the presence of the valves in the veins, they were not adequately described until Fabricius of Aquapendente (1537-1619) wrote his *De venarum ostiolis*, published in 1603. Canano had commented on their presence to Vesalius, but they are not mentioned in *De fabrica*. Fabricius also wrote on the physiology and anatomy of the uterus and the foetus, his views being expounded in *De formatu foetu*, 1600.

There is a certain amount of controversy regarding the events leading up to Harvey's demonstration of the circulation. Matthaeus Realdus Columbus (1516-1559), who was at Padua with Vesalius and succeeded him in the Chair of Anatomy, described the pulmonary circulation in his *De re anatomica*, published posthumously in 1559. This was very similar to the description given by Servetus, and it is interesting to note that Harvey refers to the work of Columbus, but had no knowledge of that by Servetus. Caesalpinus (1519-1603) was the first to use the term "circulation". He wrote that the blood flows from the vena cava to the right

heart, thence through the pulmonary artery and vein into the left heart, and finally through the arteries to the entire body. However, there is no evidence that his ideas were based upon experiment; they were rather the result of theorising. Ceasalpinus did, however, appreciate the fact that there were anastomatic connections between arteries and veins.

The age of physiological speculation was passing, and with the advent of William Harvey experimental physiology was to arise as a basic science.

CHRONOLOGICA PHYSIOLOGICA UP TO HARVEY

		School of Medicine or University
580-489 B.C.	Pythagorus of Samos	
c. 490-430 B.C.	Empedocles of Agrigentum	Pythagorean
c. 500 B.C.	Alcmaeon of Crotona	,,
c. 470 B.C.	Aegimios of Elis	,,
c. 460-*c.* 370 B.C.	Hippocrates	
c. 430 B.C.	Diogenes of Apollonia	Pythagorean
384-322 B.C.	Aristotle	Peripatetic
380-286 B.C.	Theophrastus of Eresos	,,
c. 300 B.C.	Herophilus	Alexandrian
c. 310-250 B.C.	Erasistratus	,,
c. 100 A.D.	Rufus of Ephesus	Pneumatic
130-200 A.D.	Galen	Eclectic
c. 450 A.D.	Nemesius, Bishop of Emesa (Syria)	
980-1037	Avicenna	Arabian
965-1038	Alhazan	,,
1193-1280	Albertus Magnus	Salernitanian
c. 1210-1288	Al-Qurashi	Arabian
1214-1294	Roger Bacon	Oxford
c. 1276-1326	Mundinus de Luzzi	Bologna
1452-1519	Leonardo da Vinci	
1460-1524	Thomas Linacre	Oxford
1478-1555	Jacobus Sylvius	Paris
1493-1541	Paracelsus	Basle
1497-1558	Jean Fernel	Paris
1511-1553	Michael Servetus	Paris
1511-1568	Amatus Lusitanus	Salamanca
1514-1564	Andreas Vesalius	Padua
1515-1579	Giovanni Battista Canano	Ferrara
1516-1559	Realdus Columbus	Padua
1519-1603	Andreas Caesalpinus	Pisa & Rome
1520-1574	Bartolommaeus Eustachius	Rome
1523-1562	Fallopius	Padua
b. 1530	Leonardus Betallus	
1530-1589	Julius Caesar Arantius	Bologna
1534-1600	Volcher Coiter	Groningen
1537-1619	Fabricius ab Aquapedente	Padua
1544-1603	William Gilbert	Cambridge
1561-1636	Sanctorius	Padua
1564-1622	Galileo Galilei	Pisa, Padua & Florence

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LETTERS TO THE EDITOR

The Editor,
St. Bartholomew's Hospital Journal,
London, E.C.1.

Sir,

We would like to draw the attention of your readers who are graduates of the University of London and members of Convocation, to the next ordinary meeting of Convocation, which is at 6 p.m. on Tuesday, May 12th, at the Senate House, Malet Street, W.C.1. As the Guest Speaker at that meeting will be Dr. C. F. Harris, the Vice-Chancellor, and as the title of his address is "Problems of Medical Education," we feel he should have the support of London medical graduates, and graduates from Bart's in particular.

Further, may we take this opportunity to urge London medical graduates who have not joined Convocation to do so by applying to the Registration Officer, University of London, Senate House, Malet Street, W.C.1., for the appropriate form of application and returning the completed form to him with a fee of One Pound.

May we also appeal to members of Convocation to attend its meetings as often as possible?

Yours faithfully,
BASIL HUME, *Senator.*
HENRY BUNJE,
A. J. M. REESE,
NAPIER THORNE, *Members,*
Standing Committee of Convocation.

61 Harley Street,
London, W.1.

A SEQUENCE OF EVENTS

by **Trevor H. Howell, F.R.C.P.Ed.**

The study of medical text-books, although necessary for passing examinations, is not altogether adequate as a preparation for practice. The student is liable to acquire a number of pictures of diseases as separate entities. The literature gives little indication that the presence of one form of pathology may modify the signs and symptoms of another. Nor does there exist an adequate presentation of the topic of "complications". The present system of medical education provides the young doctor with a series of transverse sections of disease. He rarely, therefore, has the opportunity to follow a patient's illness through from start to finish. Hence, the view provided by a longitudinal section of disease, over several months, is missed. A recent enquiry into the conditions complicating cerebral thrombosis provided some interesting examples of this longitudinal view of disease. It was felt that the whole story of one case might, perhaps, be illuminating.

Martha A. was a widow, living in a first-floor flat. Owing to rheumatic pains in her knees, she found getting up and down stairs troublesome. Since she was 78 years old, her doctor referred her to a Geriatric Out-patient Clinic for treatment. A diagnosis of osteoarthritis of the knees, complicated with hypertension, was made. The old lady responded well to physiotherapy and improved considerably.

One day, however, the physician observed a change in the lady's gait. Instead of the usual slight limp, there was a definite dragging of the left leg. This suggested a possible upper motor neurone lesion, probably due to cerebral thrombosis. Neurological examination confirmed this: the left plantar was of Babinski type. With appropriate treatment, Mrs. A. again improved but continued to attend the Clinic as an out-patient. A Home Help was provided by the local Welfare Department to assist with housework and shopping, thus allowing the patient to maintain her independence.

After a time, Mrs. A. was missed at the Clinic and letters of enquiry to her flat were not answered. Contact with her general practitioner revealed that she had suffered another stroke and had been admitted to a near-by general hospital.

About a year later, the Almoner from this same hospital wrote to the Physician of the Geriatric Unit, asking if a "chronic sick" patient could be transferred to his wards. On arrival, the case turned out to be none other than Mrs. A. She was now helpless, bedfast and incontinent; having been kept in bed without any attempt at rehabilitation for twelve months. Both plantars were extensor, the blood pressure had dropped to 150/90; there was oedema of the ankles and a chronic urinary tract infection was present. When this infection was eradicated by treatment with antibiotics, most of the incontinence disappeared. A course of physiotherapy and remedial exercises was started. The patient soon became fit to sit out of bed in a chair.

Gradually, she learnt to stand and to walk again. But, just as plans were being made for Mrs. A. to go to a convalescent home, she had an attack of upper abdominal pain. With the aid of a barium meal, a diagnosis of hiatus hernia was established and suitable treatment was instituted. Three weeks later, the patient left hospital, without pain and fully mobile.

Mrs. A. was now considered to fall into the category of "frail ambulant" cases. She remained under supervision at the convalescent home for nine months, living a comfortable, but limited existence. One day, however, there was another attack of abdominal pain and she was re-admitted to the wards of the parent Geriatric Unit. A provisional diagnosis of cholecystitis was made on clinical grounds. Later, the type of pain seemed to alter. It had some association with food and intermittent attacks of vomiting made their appearance for the first time. Before a further barium meal could be performed, the patient suddenly showed haematemesis and melaena. She collapsed and died quickly, in spite of blood transfusion.

By this time, the case sheets of Mrs. A. contained a number of different diagnoses. It was therefore decided to ask permission for

autopsy, since the case was one of great clinical interest.

At post mortem, the body was that of a plump old woman. Fluid was present in both pleural sacs. The lungs showed basal congestion and oedema, with patchy bronchopneumonia. The heart weighed 380 g. The wall of the right ventricle was thin and had much fatty infiltration. The left ventricle was normal, apart from the mitral and aortic valves, which were atheromatous. The coronary arteries were narrowed by patchy calcification The aorta showed considerable calcification below the arch and patches of ante mortem clot were found in places. There was an ovarian cyst, containing mucinous fluid The uterus was the size of a cricket ball, with a degenerating pale fibroid tumour. The spleen was soft and pale, weighing 108 g. The kidneys (160 g each), showed slight cortical scarring with little arterial thickening.

Examination of the brain showed two areas of pigmental softening adjacent to each lenticular nucleus. The knee joint had osteoarthritis with loss of cartilage and some articular lipping.

As expected, the stomach revealed a hiatus hernia. The duodenum was bound by adhesions to the gall bladder, which was full of calculi. In the first part was an ulcer the size of a thumb nail, which had eroded a large artery. The remainder of the gut was full of blackened faeces, some of which were lodged in diverticula of the descending colon.

Here, indeed, was a baker's dozen of different pathological findings. While some of the conditions had been diagnosed during life, there were others which had given no clinical signs. The stiffness of the knees which was the original presenting symptom had been succeeded by other complaints, one after another. This sequence of events is not uncommon in the elderly, whose tendency to multiple pathology must always be remembered.

SPORTS NEWS

VIEWPOINT

Now that summer is upon us, we can at last relax and survey the results of sporting activities during the winter and spring.

Pride of place must surely go to the Ladies' Hockey team, who won the Hospitals' Cup for the sixth successive year. To ensure their success, they treated the astonished residents at Charterhouse to occasional glimpses of road-running, tactics and femininity. Congratulations to Miss Tomkins and her team.

Much has been written about the Rugger team in the past months, and we need only say that they have added much to the sporting prestige of this hospital.

The performances of the Soccer team have been encouraging, but in contrast to this, the Hockey Club have met with little success. It was depressing to see the latter struggling to avoid the monotonous cancellations of the 2nd XI fixtures. Surely the club deserves more support from its playing members.

RUGBY CLUB

Cup Final

St. Barts v St. Marys. Played at Richmond on Wednesday, March 18th. Result: Match Drawn 6—6.

For the second time in three years, Barts had reached the final of the Hospitals Cup. After great wins over Guy's and St. Thomas's, it seemed that this was to be our year at last. The pre-match activities at Richmond were no less enthusiastic than usual, but they left *The Times* correspondent with little to criticize. Percy was escorted to a position of honour behind one of the goal-posts, and indeed he seemed the only impassive spectator throughout the afternoon. Both teams were at full strength, the ground was firm, and the weather too cold for the spectators' comfort.

Mary's kicked off and caught the defence napping. However, the ball was scrambled in to touch close to the Barts line. A forward rush relieved the immediate pressure, but from the ensuing scrum on the Barts ten-yard line, MacKenzie was caught off-side, and Leete kicked a fine penalty to put Mary's in the lead. Barts retaliated strongly and encamped in the Mary's 25. Their forwards repeatedly hurled the ball out to Rees Davies, who tried desparately to find a gap in the defence. This held firm until B. Richards sent a long pass from the base of the scrum to J. Stevens who dropped a goal and equalised the scores. Soon after this, Rees Davies received a kick above the eye and had to leave the field. This disorganised the Barts attack, as neither Philips nor Bamford were at home in the outside-half position.

Play was fast and furious as both sides strove to score. Penningon failed with two long penalty attempts, before Lute took a second kick at goal after

The Bart's pack about to get the ball once more from the line out, W. P. Boladz reaching for it.

a Barts forward had been penalised for off-side. Once again this sailed between the posts to give Mary's a three point lead at half-time.

In the second half, Bart's completely dominated the play. Boladz and Harries won the ball from the line-outs with monotonous regularity, well supported by prop-forwards B. O. Thomas and Pennington. Rees Davies returned with one eye completely closed by strapping, but although he returned to his regular position, he was badly handicapped. As a result, the threequarters never moved smoothly enough to open up gaps in the powerful Mary's mid-field defence.

At last Bart's equalised from a great penalty kick by Pennington, and when MacKenzie broke right up to the Mary's posts, it seemed thatBart's must score the deciding try. However he was not backed up, and a great chance went begging.

Mary's broke away in the last few minutes, and almost scored after a long kick-ahead, but Halls somehow managed to get back and save the dangerous situation.

So a draw resulted, with most people feeling that Barts deserved to have won. Their pack had played superbly, but scoring opportunities were not taken.

Team : A. P. Ross ; G. J. Halls, J. Stevens, J. K. Bamford, R. M. Philips ; R. R. Davies, B. Richards ; B. O. Thomas, J. W. Hamilton (Capt.), J. H. Pennington ; W. P. Boladz, M. L. Harries ; D. A. Richards, L. R. Thomas, J. C. MacKenzie.

St. Barts v St. Mary's. Played at Richmond. Wed. Mar. 25th

With five players injured after the previous battle, Barts were reluctant to replay at such an early date. However all protests were overruled by the U.H. Committee. Barts fielded the same team as before, thanks mainly to valiant efforts by the Orthopaedic department.

In contrast to the first game, the weather was sunny with a stiff breeze blowing across the field. There were no demonstrations before the match and the crowd seemed more subdued than previously, as if realizing that a do-or-die effort by Barts was in the offing.

Pennington kicked-off into the sun, and gained touch well inside the Mary's half. Barts gained possession from the ensuing line-out, and Bamford grub-kicked up to the line. The defence cleared the danger, but were repeatedly tested by diagonal kicks of all varieties. This was the Barts plan of attack, based on the strength of wings Halls and Philips. However, the Mary's pack covered well and full-back Pavier remained cool under great pressure. On one occasion, Philips gathered a kick-ahead just short of the Mary's line but was well held. His inside pass was a little to high and a great chance was missed.

Then a loose maul on the half-way line resulted in the Mary's scrum-half gaining possession. He broke clear and sent outside-half Spreule away on a deceptive run. He drew the covering defence and sent Leete in to score an unconverted try. Soon after this, Leete almost increased the score with a penalty kick that was disallowed after one of the linesmen had raised his flag.

Barts were still gaining possession in the tight, but the Mary's back row were harrassing Rees Davies unmercifully. Halls was unlucky not to score when he was chasing a kick-ahead but was obstructed at the vital moment.

There was no further score at half-time.

After the interval, the standard of play deteriorated. Mary's were holding their own in the line-outs and their three-quarters, with more room in which to move, looked dangerous on many occasions. However the tackling was generally good and neither side could take advantage of the repeated changes in territorial superiority. Pennington was desperately unlucky when his penalty attempt to equalise, hit an upright and came back into play. Just as the Final whistle was about to blow, a quick break by the Mary's scrum-half sent Spreule over for an unconverted try. This was indeed a sad end and fifteen weary Barts players applauded Mary's off the pitch.

Once again, we failed at the last hurdle, but we failed with honour. In the replay, we lost to the better team on the day.

J. Hamilton was an outstanding leader who brought out the best in his fine pack of forwards. In this game, Rees Davies had obviously not fully recovered from his eye injury, and was unable to produce his top form, but his defensive kicking was quite invaluable.

Team : A. P. Ross, G. J. Halls, J. Stevens, J. K. Bamford, R. M. Philips ; R. R. Davies, B. Richards ; B. O. Thomas, J. W. Hamilton (Capt.), J. H. Pennington, W. P. Boladz, M. L. Harris; D. A. Richards, L. R. Thomas, J. C. Mackenzie.

Inter Firm Seven-a-Side Competition

This was played at Chislehurst on Saturday April 4th, and in glorious sunshine, spectators and players had a most enjoyable afternoon.

More teams than usual had entered this year, and it appeared that the Finalist's, Kids and Second-Year Preclinicals had the most powerful teams. However, later results did not altogether support this assessment. The Finalists met and were narrowly beaten by the Kids VII in the second round. The Preclinicals won both their matches and went into the Final without having been really tested. In the other Semi-final, the "Midder and Gynae" VII surprised everyone by trouncing the Kids VII.

While the teams concerned were resting before the Final, the Registrars played the Housemen in the traditional annual fixture. Both teams were at full strength, though it might be whispered that certain recent finalists seemed to be approaching consultant status at an indecent speed. Play was both exciting and amusing, with Mr. Kingsmill-Moore surprising us with the fastest turn of speed seen during the whole afternoon. In the end the Registrars triumphed by 11 pts. to 3.

The Final of the Sevens Competition was played at a good pace. The Pre-clinicals were quickly ten points up after spectacular tries from Perry and Boladz. The Midder VII began to settle down, and reduced the arrears with a try by Constable. Just before the interval, a further try by Boladz put the Preclinicals ahead by 13 pts. to 3.

The heat began to tell in the second half, but the Preclinicals scored two further tries through J. Stevens, P. Watkinson again kicking the conversions A late try by Alder kept the game alive, but the Final whistle came, and the Preclinicals retained the Cup, winning by 23 pts. to 8.

A feature of the afternoon was the fine refereeing of Jock Dowie and Bob Davies, who must have finished as the most tired men on the ground.

The lady spectators were entertained to a most enjoyable dance later in the evening, joined at this stage by a coach-load of charming nurses.

HOCKEY REPORT

1st XI v Past Bart's on March 8th. Chislehurst. Won 4—0.

After a succession of losses, we came up against less fit opposition in this match. Played in very slippery conditions it was soon obvious that our speed was going to be the main factor, though control was difficult. P. J. Kingsley, returned from duty with his county, scored three goals in the first half, and one in the second, but we should have scored more. Dr. J. B. Nichols looked as if he had been playing regularly throughout the season, and but for him our score would have been much greater.

As usual in this match, though regretably not at others, there was a large crowd of supporters of all ages and the occasion was enjoyed by all.

Next season the match will be played on Saturday, November 21st, and any former Bart's players interested should contact Dr. Geoffrey Hirst, 138 Brigstock Road, Thornton Heath, Surrey, to whom all thanks are due for his continued organisation, and to him and his team for their hospitality.

Team : A. J. Gordon, M. J. Defrates, J. Harrison, D. S. Wright, K. MacKenzie Ross, P. Bennett; C. A. McNeill, P. Caine, D. N. C. Glover, D. Godwin, P. J. Kingsley.

1st XI v Oxted on March 14th. Chislehurst. Won 5—1.

Once again Bart's was always on top, but in spite of the space we were allowed and our superior speed, we did not score as often as we should have done. After a number of missed chances by several forwards, Kingsley opened the scoring, and Robertson and Glover added further goals in the first half. Far from improving as a result of our advantage, we appeared to be overcome by our unaccustomed tally, and play deteriorated in the second half to back-yard standard. Oxted scored from a long corner, and towards the end of the half Bart's decided to earn their jug of beer. Wright,who had moved into the forward line, went through to score, and Robertson, making up for a lapse just before, it a good goal from a narrow angle.

This was an easy match, and until passing and shooting improve drastically, we cannot hope to defeat good opposition.

Team : A. J. Gordon, H. Walker, J. Harrison ; D. S. Wright, K. McKenzie Ross, P. Bennett ; P. Caine, P. J. Kingsley, D. N. C. Glover, A. Chant, A. Robertson.

Inter-Hospitals Six-a-Side Competition. Cobham, March 22nd.

This was a remarkable achievement. The competition was arranged in three groups of four teams, each of which played other. The group winners tossed to see who should go straight to the final.

We hardly dared hope to repeat last year's performance, when we won the competition, but in fact we

came very near it. St. Thomas's quite confident of reversing last year's decision, were sorely discomforted. They opened the scoring as a result of a defensive error, but were never in the game afterwards. Drinkwater scored once and then again from a beautifully angled shot, and a good goal by Glover had to be disallowed as the umpire had blown for a short corner. In the second half Bart's held on fiercely to keep their opponents out at all costs. Three minutes from the time Wright, making a sally to the opposition circle, fell and sprained his ankle. In spite of this Bart's held on without difficulty and deserved their victory.

Wright was unable to play after this and his place was very ably taken by a Westminster occasional player, the President's offer to stand in thus being appreciated but not taken up. We were thankful for his support and that of Mrs. Jayes who had come over in spite of the inclement weather.

Defensive slips were frequent in our next game and we turned three goals down. A pep talk from Drinkwater had the desired effect however, and he led the way with two goals. Kingsley then picked up a good pass and made no mistake, and just before the end, Glover took a pass at full stretch and put the ball just inside the post. The next match was much less tiring. Drinkwater scored thrice and Glover and Kingsley once each. We went to tea exhausted but well satisfied. Our luck was out however, and we had to play in the semi-final. U.C.H. attacked from the start, but could not score. Then Glover broke away to score. From then until near the end Bart's were on top, but then two defensive errors occured and the U.C.H. centre-forward was too good not to take full advantage of them and so we lost 2—1.

In the final an exhausted U.C.H. were no match for a well-rested Charing Cross I team.

Although we did not win the competition it was a considerable achievement to win the hardest section of the draw, and to come so near retaining our title.

Team : M. J. Defrates, D. S. Wright (Capt.), D. Godwin ; P. Drinkwater, D. N. C. Glover, P. J. Kingsley.

Results : Beat St. Thomas's 2—1.
Beat Westminster 4—3.
Beat Charing Cross II 5—0.
Semi-final. Lost to U.C.H. 2—1.

If the passing and shooting had been of this standard throughout the season we should undoubtedly have been much more successful in first eleven matches. We hope for fresh blood from Cambridge next year (we had none this season) and as so many preclinicals are now playing, we can hope for better things to come.

The second eleven looked good to start with, but there was too little support and most games had to be cancelled as a result. Apat from one disastrous game in which thirteen goals were scored against them, the team played quite well. Against London II in the junior cup we won very convincingly 5—0, and only went down to Guy's II 2—0 in a close and well-fought game.

Results : 1st XI. Won 3, Drawn 3, Lost 16.
Goals : For 36, Against 74.
2nd XI. Won 2, Lost 4.
Goals : For 9, Against 25.

D.S.W.

Vicarage Club XI, 6. Ladies' Hockey Club, 2.

Not since the Lambeth Conference have so many ecclesiastical gentlemen gathered together with such singleness of purpose. In little else, however, did the Vicarage of Bart's resemble their venerable counterparts of Westminster—and even their purpose was doubtful !

The motley crew who took the field against the Ladies' Hockey Team at Chislehurst on March 4th looked fierce, but each one was willing to admit to being just a little scared ! At least five of the players were wielding " bats, racquets or clubs "—as they variously called their weapons—for the first time. The goalkeeper had only played on ice before, since at Princeton, field hockey is " just a girl's game." Not so over here, as he soon learnt to his cost. He really shouldn't have played in gum boots —ankles are so vulnerable !

The Vicars obviously believe in the not-so-old adage—" If you want to get ahead, get a hat." Deerstalker, so'wester, salmon-fisher, Alpine and just plain woolly—all made their appearance, and were so much admired that they were later stolen.

Play may be described as fast, furious and sometimes just horrid. The Vicars may have been rough at times, but the Ladies were rougher. Many times a good man was seen to bite the dust after a crafty twist of a stick or a gentle prod at a shin. To say that the inside right was surprised when he scored the first goal for the Vicars would be an understatement—he was flabbergasted—he'd never played before ! When he scored again, later in the game, he was No. 1 hero.

Half-time was reached with the score 3—0, and the clerics, though in the lead, looked much the worse for the fast pace of the game. A few suggestions for improving the game were put forward, most were rejected immediately, but it is difficult to find an argument against play with both sides of the stick—what can one say, when the Vicar in question had been using both sides of his to good advantage during the first half ?

The second half was started with only eight Vicars on the field. The other three, we must assume, were having a prayer-meeting in the pavilion, for they certainly re-appeared a short time later spiritually refreshed ! By this time the Ladies had nearly scored twice, and were attacking furiously—storming the opposition's open goal incessantly. The goal, however, was soon filled by a worthy gentleman wearing a goalkeeper's pad around his manly chest and brandishing an open umbrella. What's a girl to do ? This one scored a goal !

With the score at 3—2 to the Vicars, the ladies were really out for blood, and several times it seemed inevitable that they would score again, but time and again the ball was cleared upfield by fair means or foul.

How the game eventually finished at 6—2 is difficult to describe. Suffice it to say that during the last ten minutes a set scrum on the twenty-five was called for, to settle a dispute in front of the Ladies' goal. The final whistle blew just as it seemed certain that the Vicars would score again.

After the game bruises were examined, some in private, some in public, and it was generally assessed that the Vicars had come off much the worst. In fact, it was a Pyrrhic victory !

Miss Tomkins is chaired off the field after the Cup Final.

LADIES HOCKEY CLUB

Bart's v. Royal Free Hospital—Saturday, March 14th. Final of the Hospital Cup. Won 3—1.

The game started slowly, and for the first ten minutes the play was uninspiring and confined to midfield. For the next few minutes, the Royal Free emerged as the more promising side, with the first dangerous attacks on their goal, which were fortunately aborted by the Bart's goalie, I. Tomkins, after the defence had been defeated several times. At this stage in the game, Bart's were much the slower of the two sides, but the repeated attempts at goal by the Royal Free forwards gradually stirred them into greater activity, and the forwards were given their first chance to score. Royal Free continued to attack, and their efforts were rewarded by a goal, the ball finding its way into the net after a scrummage in the goalmouth. This finally stimulated the whole of the Bart's team, which gradually emerged as the more skilfull and determined side. Time and again, J. Swallow took the ball down the left wing, but the forwards seemed unable to penetrate the hard-working Royal Free defence and make the score even. Towards the end of the first half, however, centre forward S. Minns, a welcome newcomer to the Bart's team, scored a well deserved equaliser, making the score 1—1.

Bart's had the edge on play during the whole of the second half, with the halves backing up well, and the forwards repeatedly pressing on the goal, urged on considerably by the cheers from the spectators on the sideline. Momentary anxiety flashed through the atmosphere when the ball appeared in the Bart's goal, but this was disallowed, as the ball had not been touched within the circle. A good pass across the circle laid the way for the second Bart's goal, which was brilliantly scored by J. Chambers, while S. Minns scored again to bring the final score to 3—1, a well deserved victory.

The Shield was presented to the Captain of the team, I. Tomkins, by Mr. D. F. Ellison Nash, the President of the United Hospital's Womens' Hockey Club. Others present watching the match, included Professor A. Wormall, Mr. B. Hume, Dr. M. Blunt and Dr. H. Lehmann. The team would like to thank them very much for their continued and active support.

Team: I Tomkins (capt.), J. Tufft, T. Coates, M. Childe, J. Hall, E. Knight, J. Arnold, J. Hartley, S. Minns, J. Chambers, J. Swallow.

Sat. Feb. 28th. v. King's College. Home. Lost 2—5.

This should have been a fast open game, for the pitch was in excellent condition. The Barts defence tended to muddle each other throughout the game and on occasions stood waiting for the ball rather than running to intercept a pass. Defence still get drawn to the site of play, leaving their opposing forwards free to shoot when they receive the ball. Too often the goalkeeper is the only remaining line of defence, and unfortunately she is far from unpenetratable.

S. Cotton made her debut as a forward and adapted her play well. In the 2nd half S. S. Minns moved from C.F. to R.I. and was far more useful, obviously

her style is very curbed in the middle of the field. As usual J. Swallow played well on the L. W. The other forwards would do well to notice how she receives the ball while on the run, and continues to control the ball when moving at speed.

Goals : J. Swallow (1). J. Chambers (2).
Team : I Tomkins (Capt.); J. Tufft; T. Coates; M. Childe; J. Hall; E. Knight; J. Arnold; S. Minns; S. Cotton; J. Chambers and J. Swallow.

The Editor,
St. Bartholomew's Hospital Journal.

Sir,

As you will know, the St. Bartholomew's Hospital Women's Hockey Club have most gracefully carried off the Inter-Hospital's Shield for the sixth successive year. Mr. C. K. Vartan tells us that the Swimming Club had an equal run of success, for they won the Water Polo Cup from 1929 to 1934 inclusive, but we have not heard of any other rivals for what may well constitute a record. May we, therefore, through the courtesy of your columns, appeal to club secretaries, or other individuals who may possibly remember similar consecutive victories, to state their claims.

Yours sincerely,
MICHAEL J. BLUNT
A. WORMALL

Departments of Anatomy and Biochemistry,
Medical College of St. Bartholomew's Hospital,
Charterhouse Square,
E.C.1.

WOMEN'S LACROSSE CLUB

London University Inter-Collegiate Tournament.
March 14th at Motspur Park.

v Queen Elizabeth College. Draw 0—0.
v Guy's Hospital. Won 4—1.
v. Bedford College. Lost 2—3.
v King's College. Won 2—1.

Final Result :

Q.E.C. 6 points, 8 goals.
Bedford 6 points, 8 goals.
Barts. 5 points, 8 goals.

In a replay Bedford had a 2—0 win against Queen Elizabeth College.

The Women's Lacrosse Club formed at the beginning of the season by popular demand, put up a very encouraging performance in the London University Inter-collegiate Tournament on Saturday, March 14th.

Playing their first match on a full sized pitch, the team held their first opponents, Queen Elizabeth College, to a draw. This was a scrappy game, but the defences played extremely well and it was due to them that Queen Elizabeth College were unable to break through.

The second match against Bedford was more difficult ; for although we had four shots at goal in the second half and play was mostly at our end of the field, their stickwork was superior and their teamwork more co-ordinated, which combined to give them a close victory. As play continued the team gained confidence, and the standard improved.

Proving their ability, the team won their next two

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VITAMINS FROM VITAMINS LTD. (DEPT. G.1), UPPER MALL, LONDON, W.6.

matches — against Guy's Hospital and King's College.

Throughout the Tournament the Defences played very well ; and of the Attacks, P. Aldis and J. Pitt were outstanding.

Team : S. Ducker (Capt.), J. Anderson, R. Benison, J. Pitt, A. Kark, P. Aldis, C. Telfer, D. Layton, A. Clarke, S. Whittaker, C. Lloyd, S. Williams.

(J. Dacie, S. Barber, E. Langford also played this season).

As the Women's Lacrossse Club was only formed in October of last year, this season has inevitably been rather devoid of fixtures. Of the three fixtures that were arranged for this term, two were cancelled by our opponents. However, in spite of these disappointments we have been very grateful for the encouragement that has been given by members of the Staff of the College and Hospital.

Our thanks are also due to the support given to us by the Student's Union and Mr. White at Chislehurst, who has given us a pitch of our own, where we have been able to play one match and to practice. With more matches next year, we hope to make fuller use of the pitch and also the potential ability of the players.

We very much hope that the encouraging result of the Tournament is merely a foresight of things to come.

BOOK REVIEWS

MEDICAL LABORATORY INVESTIGATIONS. By Ian Dawson, M.A., M.D., M.R.C.P., and William Goldie, M.A., M.B., F.R.C.P., F.R.C.P. (Edinburgh). London. Butterworth and Co. (Publishers) Ltd., 1958. pp. 260. 35*s*.

Professor Pulvertaft of Westminster Hospital Medical School points out in the foreword to this book that expansion in the field of clinical pathology has been so rapid that no doctor qualified more than ten years ago can have received basic instruction as a student on investigations and their interpretation — which are now in daily use. The purpose of this book is to help everyone who has to request or interpret a laboratory investigation. The authors are a happily matched pair, one of them being a reader in Pathology in the University of London and an honorary Consultant Pathologist at Westminster Hospital ; the other a Senior Consultant at a National Health Service Hospital and a part-time lecturer in Pathology at the University of Leeds. They should have come across a very wide variety of demands for information and types of question needing an answer. Perhaps the most useful feature is the number of tables giving, e.g., common causes of leucocytosis, a schematic representation of blood coagulation, findings in the cerebro-spinal fluid in various diseases, investigations on faeces, and so forth. There is instruction on the collection of specimens, on how to fill out a request form, on the despatch of specimens, including postal regulations. The range of normal values and, what is particularly important, errors inherent in the examinations of specimens in general, and of any method in particular, are defined. Lastly, the nature of the reports on specimens is considered in detail.

Not all of the problems are answered completely satisfactorily. For instance, if one wants to know the normal values for radio-active iodine uptake and protein-bound iodine level no figures are given and there is merely a brief description of each test of about 30 words, and the information that the investigation can only be carried out in very few laboratories, but on the other hand, descriptions of estimations of other endocrine gland functions are most informative.

Perhaps the authors may wish to correct in their next edition the statement that cholinesterase level is raised in liver disease.

There is a valuable section on the procedure after the death of a patient, and how to deal with stillbirths.

This will be a most useful addition to the armamentarium of all those who want to use the Pathology Department to the best mutual advantage.

H. L.

AN INTRODUCTION TO PATHOLOGY. By G. Payling Wright. Longmans. 45s. pp. 660.

This is the third edition of this excellent book, and the fact that there have been only two years since the book's first appearance in 1950 when neither a new edition nor an impression have failed to appear, testifies to its success and popularity.

Many students have found this book most interesting and informative reading and a very sound *introduction* to pathology. This book is no substitute for the manuals of Pathology wherein are found the more minute details of the subject. However this book is a most excellent preparation before delving into such manuals or tackling the literature on the newer aspects of the subject. In this new edition some of the references to the older literature have been supplanted by more recent references.

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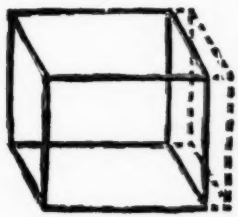
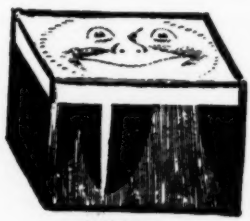


WHEN Herr Professor Schaumbläser of The *Schwarzbiergeschmackinstitut von Untervallop* is experimenting into the expansion of liquids, he is finding that water is expanding by 8% when it is being frozen. But *Himmel*! Who is wanting 8% more water ? Guinness now, that is a very different *Fischkessel*. If he is freezing twelve bottles of Guinness then he is getting one bottle of Guinness extra which is for him good. *Ja ! Fein ! !*



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